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## REPORTS OF OBSERVATORIES.

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The annual publication in one place of brief reports upon astronomical researches made in this country would seem to be desirable. Those desiring to prepare such reports are requested to forward manuscript to FRANK SCHLESINGER, International Latitude Observatory, Ukiah, California.

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### NAVAL OBSERVATORY, WASHINGTON, D. C.

During the year the following changes have taken place in the personnel:—

Professors of Mathematics THOS. J. J. SEE and MILTON UPDEGRAFF were detached from the Observatory on September 20, 1902, and ordered to duty as instructors in the Department of Mathematics at the United States Naval Academy, where their services were urgently required, owing to the great scarcity of line officers in the navy who had formerly done this work.

November 1, 1902, Captain CHAS. H. DAVIS, U. S. N., was relieved as Superintendent by Captain COLBY M. CHESTER, U. S. N.

The instruments have been used as follows:—

The 6-inch transit-circle has been devoted to routine observations of the Sun, Moon, and planets, together with the special lists of heliometer comparison-stars issued by Sir DAVID GILL.

The 9-inch transit-circle has been undergoing repairs and improvements.

The prime vertical transit instrument has been devoted to observations for the determination of aberration, nutation, and variation of latitude, and to the determination of the Declinations of 390 miscellaneous stars.

The alt-azimuth instrument has been devoted to a determination of the latitude of the Observatory and the Declinations of 350 standard stars.

Photographs of the Sun have been obtained with the photo-heliograph on every clear day.

The equatorials have been devoted to measurements of the diameters of the planets, to observations of their satellites, to observations of asteroids, comets, occultations, and variable stars.

During the year volume II, Publications of the U. S. Naval Observatory, Second Series, containing the observations of the

Astronomische Gesellschaft Zone  $-13^{\circ} 50'$  to  $-18^{\circ} 10'$  has been issued, and volume III is in press.

The formation of the catalogue from the observations in volume II is in progress, and some work has been done on cataloguing the Washington Zones 1846 to 1852.

A very important part of the work of the Observatory consists in the inspection, purchase, care, and issue of chronometers, watches, sextants, octants, telescopes, binoculars, and surveying and photographic outfits, including all nautical instruments except compasses. The regular annual trial of chronometers includes about one hundred chronometers, of a value of about \$30,000, and lasts six months. The time service, maintained in connection with the chronometer service, sends out daily, except Sundays and holidays, telegraphic noon-signals that reach all points of the country, correcting some 40,000-clocks and dropping sixteen time-balls.

The following articles from members of the Observatory staff have appeared during the year: The Naval Observatory Eclipse Expedition to Sumatra, by A. N. SKINNER, (*Popular Astronomy*, January, 1902); Observations of the Diameters of the Satellites of *Jupiter* and of *Titan*, the Principal Satellite of *Saturn* (observations by daylight), by T. J. J. SEE, (*A. N.*, No. 3764); Micrometrical Measures of the Equatorial Diameter of *Saturn* and of his System of Rings (observations by daylight), by T. J. J. SEE, (*A. N.*, No. 3768); Micrometrical Measures of the Diameter of *Uranus* (observations by daylight), by T. J. J. SEE, (*A. N.*, No. 3768); Observations of the Satellites of *Saturn* and *Uranus*, by T. J. J. SEE, (*A. N.*, No. 3806); Observations of Heliometer Comparison-Stars, by M. UPDEGRAFF and J. C. HAMMOND, (*A. J.*, No. 528); Micrometric Measures of Double Stars, by E. A. BOEGER, (*A. J.*, No. 522); Observations of (26) *Proserpina*, by G. K. LAWTON, (*A. N.*, No. 3786); Some Results of the Total Eclipse in Sumatra, of May 18, 1901, obtained with the Photoheliograph, at Fort de Kock, by G. H. PETERS, (*Astrophysical Journal*, September, 1902); Elements and Ephemeris of Comet 1902 *d*, by H. R. MORGAN and C. W. FREDERICK, (*A. J.*, No. 528); A Device for Conducting Electric Circuits to the Eye-end of the Equatorial Telescope, by W. W. DINWIDDIE, (*Popular Astronomy*, June, 1902); Observations of Comet 1902 *d*, by W. W. DINWIDDIE

and C. W. FREDERICK, (*A. J.*, No. 528); Observations of Comet 1902 *d*, by W. W. DINWIDDIE, (*A. J.*, No. 528).

C. M. CHESTER, *Captain, U. S. N.,*  
*Superintendent Naval Observatory.*

January 12, 1903

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OBSERVATORY OF THE UNIVERSITY OF MINNESOTA.

The research work of the Observatory has been confined almost exclusively to measurement and reduction of the series of *Eros* photographs made during the winter of 1900. In taking these photographs the plan followed was to make all the exposures of a single night on the same plate; so when one plate is worked up the work of that night is finished. Exposures were made at as great hour-angles as possible, so that the Sun's parallax might be obtained by the morning and evening method. This plan was successfully carried through on about fifteen nights, and only partially so on some thirty-five nights.

Twenty-one of the most perfect plates have been measured. They contain on an average about twelve exposures and thirteen reduction-stars. A number of filar micrometer comparison-stars were also measured, that their positions might be accurately determined. Many of the stars, however, were too faint to be photographed. Three of the plates have been provisionally reduced and the Sun's parallax computed.

From these the probable error of the position of an image, in one equation of condition, is about one tenth of a second. The probable error of the Sun's parallax, of course, will depend on the hour-angles at which the exposures were taken and the resulting parallax factor. In one of the above cases the factor is 20, making the probable error of the Sun's parallax from the night's work about 0".02.

Some difficulty has been experienced in making the measurements on account of bad images near the edge of the plates. They are usually round and well defined near the center. But half-way out from the center they begin to develop comet-like tails. These tails I afterward found may be almost completely eliminated by capping the object-glass down from its full aperture  $10\frac{1}{2}$  inches to 9 inches. This is accomplished also without materially weakening the intensity of the images.

The results of the preliminary reductions lead me to believe that the final reduction of the whole series of photographs will be reasonably accurate.

January 1, 1903.

F. P. LEAVENWORTH.

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VASSAR COLLEGE OBSERVATORY.

PROFESSOR MARY W. WHITNEY, DIRECTOR.

1. Publications of Vassar College Observatory during 1902: Observations of *Nova Persei*, by MARY W. WHITNEY and CAROLINE E. FURNESS (*Ast. Nach.*, 3757); Observations of Minor Planets, by MARY W. WHITNEY and CAROLINE E. FURNESS (*Ast. Jour.*, 517); Ditto, ditto (*Ast. Nach.*, 3795); Observations of Comet *b*, 1902, (PERRINE), by MARY W. WHITNEY and CAROLINE E. FURNESS (*Ast. Jour.*, 528); Prediction of maxima and minima of variable stars of long period for 1902, by IDA WATSON and HELEN SWARTZ, graduate students in Astronomy (published monthly in *Pop. Ast.* for 1902); the variable star *U Cephei*, by IDA WATSON (*Pop. Ast.*, June, 1902).

2. Observations of minor planets and comets are being made continuously though somewhat irregularly. There are now on hand, in various stages of reduction, about thirty observations of *Eros* and the same number of observations of minor planets.

3. During the past year, Miss COWLEY, a graduate student, was engaged in computing the definitive orbit of Comet 1826 II. A portion of the work—viz., the determination of the Right Ascensions and Declinations and proper motions of the comparison-stars—has already been completed, and was accepted as a thesis for the A. M. degree at Vassar College.

The most important work carried on is the measurement and reduction of photographic plates, a continuation of the work included in *Publications I* of the Observatory. Of the eight plates covering the region  $88^{\circ}$  to  $89^{\circ}$ , six have been measured and partially reduced. For the remaining measurement and the completion of the reduction the Observatory has received from the Carnegie Institution a grant of \$1,000, to enable us to finish the work in a year's time. The money will be expended in employing additional computers, since a large portion of the time of the director and the assistant is given to instruction.

POUGHKEEPSIE, January 6, 1903.

ASTRONOMICAL OPERATIONS OF THE U. S. COAST AND GEODETIC  
SURVEY.

In the main portion of the United States the only astronomical observations were at Tonopah, Nevada, the latitude and longitude being determined, and at Iron Mountain Furnace Tract, Tenn., latitude only. In Alaska the latitude and longitude of a point on St. Lawrence Island and of a point on Nuni-vak Island were determined, the longitudes being observed by the chronometric method. No astronomical observations were made in Hawaii or in Porto Rico.

In the Philippines the latitudes of twenty-nine stations have been determined. The longitudes of twenty-eight stations have also been determined with reference to Manila, of which the longitude had previously been determined through the cable; and azimuths were observed at twenty-three stations. Of the twenty-eight longitudes in the Philippines, twenty-seven were determined by the telegraphic method and one by the chronometric method. The figures given above for the Philippines include all stations from which any reports have reached the Washington Office up to this date, and include observations in both 1901 and 1902.

F. W. PERKINS, *Acting Superintendent.*

January 9, 1903.

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## HARVARD COLLEGE OBSERVATORY.\*

*East Equatorial.*—The observations with this instrument have been made by Professor O. C. WENDELL, and have been of the same general character as in previous years. Seventeen thousand photometric light comparisons have been made, principally with the polarizing photometer with achromatic prisms. With this photometer 1,024 comparisons were made of *X Cancr*, 992 of *U Cephei*, 960 of *U Sagittæ*, 944 of *U Scuti*, 880 of 78.1901 *Cygni*, 800 of *R Ursæ Minoris*, 752 of  $\beta$  *Persei*, 736 of  $\chi$  *Cygni*, 528 of  $\beta$  *Lyræ*, 480 of *W Delphini*, 448 of *U Ophiuchi*, 416 of  $+43^{\circ}4101$ , recently discovered here, 384 of *Nova Persei*, No. 2, 320 of *X Persei*, 192 of *R R Lyræ*, 160

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\* Extracted, with Professor PICKERING's permission, from the *Fifty-seventh Annual Report of the Director of the Astronomical Observatory of Harvard College for the year ending September 30, 1902.*

of *S W Cygni*, 160 of standard stars in the cluster *Messier 15*, 144 of *Y Cygni*, 96 of *R Coronæ*, 96 of *SS Cygni*, 64 of *T Cygni*, 64 of *T Persei*, 64 of  $\mu$  *Herculis*, 48 of *R Lyræ*, and 32 each of *U Geminorum*, *X Herculis*, *d Serpentis*,  $\mu$  *Cephei*, and *X Virginis*. In addition to the above, 1,984 comparisons were made of *o Ceti*, 288 of *U Camelopardalis*, and 1,968 of double stars, with a second photometer adapted to the comparison of stars too near together to be measured with the first instrument. The same instrument has been used in the photometric measurement of *Jupiter's* satellites while undergoing eclipse. Seventeen eclipses have been observed, making the total number 736. Photometric observations of comparison-stars for variables have also been continued, the number of settings being 192. The systematic observation of variable stars of long period throughout their changes, and the reduction of the results to the scale of the meridian photometer have been continued. Two hundred and fifty estimates by the method of ARGELANDER have been made, generally when the stars were too faint to be observed with small instruments. The selection of fourteenth magnitude standards has been continued. Several other objects of a miscellaneous character have also been observed.

Similar observations of variables and comparison-stars have been made with the West equatorial. With it 1,130 estimates of variables, and 235 estimates of comparison-stars have been made by Miss CANNON, 3,324 estimates of variables, and 170 estimates of comparison-stars have been made by Mr. CAMPBELL; with the naked eye, field-glass, and a 5-inch portable telescope. Three hundred and ninety-one estimates of variables have been made by Mr. COLSON, and 326 by Mr. WHITE. Nine hundred and eighty-one estimates of variables have been made by Mr. F. E. SEAGRAVE, of Providence, and communicated by him to this Observatory. Observations of variable stars have also been communicated by six other persons.

*Meridian-Circle.*—The principal use of this instrument during the year has been the determination of clock error, but on 20 dates observations of *Nova Persei*, No. 2, or faint stars in its vicinity, were made by Mr. DUNNE. The total number of transits, including those of circumpolar and almanac stars required for the reduction of the observations was 218. On 10

other dates observations were made with wire screens, in order to furnish an independent determination of personal equation with respect to magnitude. These observations have not yet been reduced. The power of the instrument in exhibiting faint stars was compared with that of the four-inch transit-circle of the Students' Astronomical Laboratory, by a short series of observations in June, 1902, from which it appeared, as had been previously thought, that the 8-inch object-glass of the meridian circle was less efficient than would be supposed from its size.

The reduction of the observations of stars in the zone  $-9^{\circ} 50'$  to  $-14^{\circ} 10'$  has proceeded so far that the results in Right Ascension and Declination for 1900.0 are now very nearly complete, and are collected in readiness for the computation of the mean result for each star. But it is expected that cases of large discrepancy, especially in the observations of the years 1896 to 1898, will be found to require a second reduction, and that entire zones may need small corrections when the residuals of the separate observations have been obtained for the zone journal. The work of collecting the estimates of magnitude is also largely completed, and the preparation for publication, both of the final catalogue and of the zone journal, has been begun.

The reduction of the observations made by the late Professor ROGERS, during the years 1879 to 1883, has been continued by Miss S. C. BOND under the supervision of Miss ANNA WINLOCK. The computation of the reductions from apparent to mean place at intervals of ten days for all the stars observed is now complete. About 3,000 reductions for single observations have been obtained by interpolation from these computations, and about as many more remain to be obtained.

*12-inch Meridian Photometer.*—With this instrument 66,932 settings have been made by the Director on 118 nights. In all, 265,604 settings have been made in four years. The principal work has been the extension of the photometric scale from the tenth to the thirteenth magnitude. Sequences of stars have been selected and measured for all the regions contained in Series I, II, and III, of HAGEN's Catalogues, from the magnitude 7.5 to 12.5, and in Series IV, from 7.5 to 10.5.

*Meridian Photometer.*—With this instrument 10,784 measures were made by Professor BAILEY on 30 nights, from



October 1, 1901, to April 18, 1902. It was then dismantled and sent to Peru, where he obtained 7,804 settings on 18 nights, from July 10 to September 30, 1902. The principal objects observed were a series of stars of about the fifth magnitude, one in every region  $10^\circ$  square. Each star was to be observed twice on ten nights, taking various precautions so that the resulting magnitudes should furnish accurate standards of photometric magnitude, from the north to the south pole. Various miscellaneous objects, including comparison-stars for *Eros*, *Iapetus*, and variables, were also measured. The total number of settings so far obtained with this instrument is 1,051,768.

*Henry Draper Memorial.*—Since its establishment in 1886, the Henry Draper Memorial has developed three new and unique lines of work. *First*, by the substitution of the objective prism and doublet for the slit spectroscope and single lens, the spectra of large numbers of stars are photographed simultaneously by the former, instead of singly by the latter method. These photographs have been repeated until every portion of the sky has been covered, using the 8-inch Draper telescope for the northern stars, and the Bache telescope, an 8-inch doublet of similar construction, for the southern stars. As a result, we have a photograph of the spectrum of every star in the sky permanently brighter than the ninth or tenth magnitude, besides many thousands that are fainter. These plates have been carefully examined by Mrs. FLEMING, with the result that large numbers of objects having peculiar spectra have been discovered. The number of such objects found elsewhere is small, and it is probable that all that are bright have been found from these plates, thus making this part of the work complete. We are now extending it to the fainter stars, using smaller dispersions and longer exposures. There are two classes of stars that can only be studied by frequent photographs like those described above. Of the eight *Novæ* which are known to have appeared during the last sixteen years, two were bright and visible to the naked eye. All of the others were found from the Draper photographs, and would probably otherwise never have been discovered. Variable stars of long period have very peculiar spectra, which differ greatly from one another, and can generally be photographed only when they are bright. Nearly

two hundred of these objects have been discovered from the Draper photographs. *Secondly*, by placing large objective prisms in front of the 11-inch Draper telescope, stellar spectra six inches long and showing several hundred lines have been obtained. Shorter spectra were obtained of the fainter stars, and from them a detailed study of 681 of the brighter stars visible in Cambridge was made by Miss MAURY. A similar study of 1,122 southern stars photographed with the 13-inch Boyden telescope has been made by Miss CANNON. Although the stars have thus been arranged in a logical sequence, the object was rather to show that large numbers of stars had identical spectra, and then to publish all the facts regarding a typical star of each group. All the material is thus furnished to any future investigator, so that he may continue his studies without having recourse to these or other photographs. The discovery of spectroscopic binaries, of stars having the hydrogen lines bright and variable, and of a new series of hydrogen lines, resulted from these investigations. The third field of work is perhaps the most important of all. By photographing repeatedly all portions of the northern sky with the 8-inch Draper telescope, and of the southern sky with the Bache telescope, we have a map of the entire sky showing all the brighter stars night after night. This furnishes a complete history of the heavens for every year since 1890, and a partial history since 1886. When any new object is discovered, we can trace its motion or variations in brightness, throughout this period from these photographs. As no such collection of photographs has been made elsewhere, the importance of properly caring for it, and continuing it, is obvious. An additional force of assistants is much needed to study these plates, and thus determine the past history of known objects, and of new ones as fast as they are discovered.

The number of photographs taken with the 11-inch Draper telescope is 475, making 14,020 in all with this instrument; with the 8-inch Draper telescope, 1,642, making in all 29,298. The total number of photographs of the stars taken at Cambridge during the year is 4,254. Fifteen eclipses of *Jupiter's* satellites, and ten occultations, have been successfully photographed with the 11-inch Draper telescope. Four variable stars have been found by Mrs. FLEMING from an examination of the Draper photographs. One of these,  $+43^{\circ} 4101$ , proved to be an *Algol*

variable with a period of 30 days, and duration of obscuration 2 days. This period is much longer than that of any other *Algol* star as yet discovered, the next longest period being that of *S Cancrī*, which is 9.5 days. The other three were found from the presence of bright hydrogen lines in their spectra. One of these, whose position for 1900 is R. A. =  $12^h 50^m.7$ , Dec. =  $-57^\circ 21'$ , has a peculiar spectrum. A fifth variable,  $+40^\circ 4390$ , found by Mr. J. A. DUNNE with the meridian-circle, was confirmed by the Draper photographs.

The general plan of taking the photographs, as described in the last report, has been maintained under the direction of Mr. KING. The illumination of the sky by electric lights limits the time of exposure, as the faintest stars do not appear when the fogging of the plates exceeds a small amount. For this reason, an exposure of three hours with the 8-inch Draper telescope fails to show faint stars any better than an exposure of one hour; and this instrument is not used, even for exposures of ten minutes, for several days each month, on account of the Moon. Several of the brighter asteroids are photographed every month as standards of magnitude in different parts of the sky.

*Boyden Department.*—The station at Arequipa remained under the charge of Mr. H. C. BAILEY from October 1, 1901, to March 1, 1902. It was in charge of Mr. R. H. FROST from March 1 to June 1, 1902, and since June 1, 1902, in charge of Professor BAILEY. The number of photographs taken with the 13-inch Boyden telescope is 276, making 10,630 in all. A few of these are charts of clusters, but nearly all of the remainder are photographs of the spectra of stars in which the hydrogen lines appear to be variable, and of spectroscopic binaries. Two thousand one hundred and forty plates have been taken with the Bache telescope, making 30,748 in all. Nearly all of them are charts with exposures of  $10^m$  and  $60^m$ . The total number of photographs taken at Arequipa during the year is 3,919. One reason for Professor BAILEY's trip to Peru was to study the variations in light of the planet *Eros*. At its next opposition, this planet is so far south that it cannot readily be observed in Europe or in the United States, and is so faint that powerful instruments will be required to observe it. The meridian photometer has accordingly been sent to Peru to determine stand-

ards for comparison, and also to continue the work undertaken here, as described above. One of the photometers used in the determination of faint stellar magnitudes by the co-operation of the Yerkes, Lick, McCormick, and Harvard Observatories, has also been sent to Peru. This photometer has been attached to the 13-inch Boyden telescope, and has already been used by Mr. BAILEY on 24 nights, from July 28 to September 30, 1902. Measurements have been made with it of *Sirona*, *Tercidina*, of comparison-stars for variables, and of a few variables. Attempts have been made to secure monthly observations, by ARGELANDER'S method, of 50 southern variables. This has been much interrupted by other work, but since March, 1902, it has been actively resumed.

*Bruce Photographic Telescope.*—During the last year, 438 plates have been taken with the Bruce photographic telescope, making 6,174 in all. Before February 1, 1902, these plates were taken by Dr. DELISLE STEWART, and since then by Mr. R. H. FROST. With this instrument, excellent chart plates can be obtained of regions  $5^{\circ}$  square, the images in the centers of the plates being almost perfectly circular even when the exposure lasts four or five hours. A large number of trails of asteroids have been photographed, several of which are probably new. One of these has a greater eccentricity than any other known asteroid, and exceeds that of some of the periodic comets. The name *Ocillo* has been given to it by the discoverer, Dr. STEWART, after the Peruvian goddess, who with her brother Manco was supposed by the Incas to have descended from the Sun. A photograph of *Eros* was obtained on July 7, 1902, nearly a month before it was observed elsewhere after its conjunction with the Sun.

*Blue Hill Meteorological Observatory.*—The work of the Observatory was performed, under the direction and at the expense of Mr. ROTCH, by the three assistants formerly employed. The special investigations in 1902 included determinations by day and night of the atmospheric refraction above land and water, and a few measurements of the quantity of carbon dioxide in the air and of the electrical potential of the air, by Mr. G. W. PICKARD. Commencing in December, kite-flights were made on a fixed day each month, in co-operation with simultaneous ascensions of balloons and kites in Europe. The

mean altitude above the sea of the meteorograph in the ten flights at Blue Hill was 9,200 feet, which is 1,925 feet above the mean of the flights during the preceding year, and is the highest annual average yet attained. The maximum altitude of 14,060 feet exceeds by 1,510 feet the highest flight of the year before. Mr. ROTCH's project of exploring the atmosphere above the tropics and the Equator with kites flown from a steamship was approved by the International Aeronautical Congress that met at Berlin in May, and he has requested a grant from the Carnegie Institution to partially defray the cost of the expedition. The Observatory is being remodeled, and a much needed fireproof building for the library and records generously added by Mr. ROTCH, at an approximate cost of \$6,000.

*Library.*—The library of the Observatory has been increased by 292 volumes and 973 pamphlets. The total numbers of volumes and pamphlets in the library on October 1, 1902, were 10,369 and 17,179, respectively. Special efforts are being made to render the meteorological, as well as the astronomical, collection of publications here and at Arequipa as complete as possible. Owing to the number of buildings connected with the Observatory, duplicates of important publications are in constant use. Every year the need of additional space for books is becoming more urgent.

*Telegraphic Announcements.*—Of the 22 messages distributed this year, 4 were received from Professor KREUTZ, Kiel, 9 from the Lick Observatory, 3 from the Yerkes Observatory, 2 from Professor BROOKS, and one each from four other sources. The distribution of the announcements by telegraph is continued to such subscribers as wish to pay for the messages.

*Time Service.*—On June 14, 1902, a new system of public time signals, devised by Mr. GERRISH, was put into operation. Incandescent electric lights are made to pulsate in response to the telegraphic signals of the standard clock, reproducing visually the regular standard signals which have hitherto been sent out by telegraph.

*Publications.*—Volumes XXXVI, part II, XXXVIII, XLI, Nos. VII, VIII, and IX, XLIII, part II, and XLVIII, No. I, have been printed and distributed. Volume XLIV, part II, Reduction of Observations made with the Meridian Photometer during the years 1892 to 1898, is in type. Fifty-

five pages of volume XLVI, Observations of Southern Stars, made with the Meridian Photometer in 1899, 17 pages of volume XLVII, Observations of Photographic Variables, pages 39 to 83 of volume XLVIII, Observations of the Light Curve of *Nova Persei*, No. 2, and 14 pages of volume XLIX, Photometric Observations made with the East equatorial, are in type.

The first forty-five volumes of the Annals are therefore completed, with the exception of volumes XXXIX, XLIII, and XLIV, of which the first portions only have been distributed. The four volumes following XLV have also been begun. Four circulars have been issued during the year: 62. Spectrum of Lightning (November 16, 1901); 63. An Asteroid Orbit of Great Eccentricity (November 19, 1901); 64. Early Observations of *Algol* Stars (January 18, 1902); 65. A New *Algol* Variable (May 6, 1902).

The building containing the collection of photographs of the sky had become so crowded that no room was available for the additional photographs which are made on every clear night, and yet the value of the collection is increasing every year, and furnishes the only existing history of the stellar universe for a definite number of successive years. A friend has presented the Observatory with \$20,000, making no condition except that the name of the donor should not be mentioned. A portion of this gift has enabled the Director to add to the building containing these photographs a fireproof wing of plain brick; it will provide for the growth of the collection during the next ten or fifteen years. Again, recent experiments have proved that a large reflector will show stars so faint that their study with other telescopes is impossible. We have contracted with the firm of ALVAN CLARK & SONS for a mirror two feet in diameter, to be used first on the northern and then on the southern stars, thus extending our work to vast multitudes of stars hitherto beyond our reach. The mounting will be constructed in our own workshop with a great saving of expense. It is hoped that results will be such as to influence others by the example of this gift, so that the other departments of the Observatory may be made to correspond to its great development in certain directions. The library of the Observatory, one of the most complete and valuable in the world, is in a wooden building half a century old and is liable to destruction by fire at any time.

The building containing the photographic laboratory and machine shop is also of wood and wholly inadequate for these purposes.

Another anonymous gift has been received, which is of interest as suggesting a much wider field of usefulness for the Observatory than it now occupies. This gift at present amounts to \$70,000, of which \$10,000 is at once available. The income may be used for any astronomical work, whether undertaken at the Harvard Observatory or elsewhere. The first appropriation was made last summer to furnish an assistant at another observatory, so that one of the largest telescopes in the world could be used during hours at which it would otherwise be idle. The Director of the Harvard Observatory is always likely to know of ways in which money could be expended to especial advantage for astronomical research. A pamphlet was published in 1886 by the undersigned, recommending the establishment of such a fund, and in 1890 Miss C. W. BRUCE gave \$6,000, which was expended in this way. It is believed that the results attained show how advantageously such a fund can be administered here. The usefulness of this Observatory would be greatly increased if it should become an important part of the duty of its Director to aid other observatories and astronomers, to secure observations in neglected departments of astronomy, and to enable competent observers to use the numerous large and valuable telescopes now idle. It seems as if the moral effect of thus bringing together the astronomers of the world so that they might work harmoniously on researches too large to be undertaken by any one of them, must appeal to some of the many friends and patrons that astronomy has always had. The pamphlet mentioned above contains the reasons for believing that great permanency of good management, and efficiency in the expenditure of such a fund could be attained here. At least, the present condition of the Observatory is such as to insure the immediate expenditure of several thousand dollars a year to great advantage in this way.

EDWARD C. PICKERING, *Director.*

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THE CINCINNATI OBSERVATORY.

As the staff of the observatory consists of but two,—the director and one assistant,—as considerable teaching is required, the scientific work that can be accomplished is quite limited.

Observations for the variation of latitude, undertaken in connection with the International Geodetic Association, have been prosecuted during the year 1902 as usual. For this work the zenith telescope loaned by the U. S. Coast and Geodetic Survey has been employed. This instrument is by WANSCHAFF, and is similar in construction to those of the four main stations, but somewhat smaller. The number of pairs of stars secured is as follows:—

January . . . 116	July . . . . . 166
February . . . 86	August . . . 165
March . . . . 130	September . . 15
April . . . . 118	October . . . 155
May . . . . . 154	November . . 136
June . . . . . 122	December . . 72
Total . 1,435	

The meridian-circle has been employed in the redetermination of the stars of PIAZZI's catalogue north of the equator. About 3,000 observations were secured, and this scheme of work is now nearly completed.

The weather during the year has been much more unfavorable than in 1901.

J. G. PORTER, *Director.*

INTERNATIONAL LATITUDE STATION, UKIAH, CALIFORNIA.

The programme of the International Geodetic Association for observing variations of latitude was continued throughout 1902 without modification or interruption. The number of pairs observed in each month is given below:—

1902, January . . . 150 pairs	1902, July . . . . . 207 pairs
February . . . 37	August . . . 215
March . . . . 188	September . . 180
April . . . . 167	October . . . 194
May . . . . . 173	November . . 157
June . . . . . 199	December . . 155

The total number is 2,022. The conditions that prevailed in February are not likely to be repeated here soon; during



44 *Publications of the Astronomical Society, &c.*

this month 19.4 inches of rain fell, more than during any other month since 1877, when the meteorological records for this place were begun.

Besides these observations for latitude proper, auxiliary observations were made for determinations of the instrument's position and adjustment, of the micrometer value, of the values of the level spaces, and of the periodic errors of the micrometer-screw.

FRANK SCHLESINGER.

2 Jan., 1903.

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